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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/741,323	12/18/2003	Grigorii Lev Soloveichik	126732-2	6942

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GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
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NISKAYUNA, NY 12309

EXAMINER	
DOUGLAS, JOHN CHRISTOPHER	
ART UNIT	**PAPER NUMBER**
1764	

DATE MAILED: 11/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

C

Office Action Summary	Application No.	Applicant(s)	
	10/741,323	SOLOVEICHIK ET AL.	
	Examiner	Art Unit	
	John C. Douglas	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 September 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Examiner acknowledges the response filed on 9/01/2006 containing remarks and amendments to the claims.

2. Examiner acknowledges claims 1, 19, and 22 as amended.

3. New rejections necessitated by amendment follow:

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1, 19, and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim s 1, 19, and 22 recite the limitation "4,4'-diidopropylbiphenyl" in the claims. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-4 and 7-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura (US 4982037) in view of Lee (US 5015797).

11. With respect to claims 1-3,7, 8, 11, 12, 15, and 16, Nakamura discloses a process for producing 4,4'-diisopropylbiphenyl by contacting a biphenyl with propylene and a mordenite or ZSM-5 type catalysts at a temperature between 220 and 300 degrees C (see Nakamura, column 2, lines 1-37 and 67-68).

Nakamura does not disclose that the reaction is continuous and that the feed is contacted with at least one inert solvent and an inert diluent gas. Nakamura does not

disclose where the product 4,4'-diisopropylbiphenyl is being produced with a selectivity of at least 70%.

However, Lee discloses where the alkylating agent is diluted with a diluent gas including nitrogen and argon (see Lee, column 7, lines 3-15). Lee also discloses where the process is operated continuously (see Lee, column 15, lines 50-62). Lee also discloses where the selectivity for arriving at a specific alkylated product is typically between 25 to about 80% (see Lee, column 17, lines 18-48).

Lee discloses that the use of a diluting agent increases the selectivity to near linear isomers (see Lee, column 7, lines 4-6). Also, MPEP §2144.04 V. E. cites *In re Dilnot*, 319 F.2d 188 (CCPA 1963), which held that continuous operation would have been obvious over the batch processes of the prior art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Nakamura to include here the alkylating agent is diluted with a diluent gas including nitrogen and argon in order to increase the selectivity to near linear isomers and to include where the process is operated continuously because continuous operation would have been obvious over the batch processes of the prior art.

Also, Lee discloses where a decalin solvent is mixed with the biphenyl (see Lee, column 6, lines 9-16).

Lee discloses that the use of a solvent increases the selectivity to near linear isomers (see Lee, column 7, lines 4-6).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Nakamura to include where a decalin solvent is mixed with the biphenyl in order to increase the selectivity to near linear isomers.

1. With respect to claim 4, Nakamura discloses a molar ratio of SiO_2 to Al_2O3 of from 10 to about 50 (see Nakamura, column 2, lines 53-56).

2. With respect to claims 9 and 10, Nakamura discloses where the molar ratio of propylene to biphenyl is 0.5 to 2.2 (see Nakamura, column 2, lines 57-58 and claim 2).

3. With respect to claims 13 and 14, Nakamura does not disclose where the contacting is performed under a pressure of from about 2 atmospheres to about 40 atmospheres.

However, Lee discloses where the contacting is performed under a pressure from about 10 psig (1.7 atm) to about 500 psig (35 atm) (see Lee, column 16, lines 30-41).

Lee discloses that a pressure less than 10 psig causes the catalyst to lose selectivity for linear and near linear isomers and a pressure greater than 500 psig will cause the olefin to polymerize (see Lee, column 16, lines 30-41).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Nakamura to include where the contacting is performed under a pressure from about 10 psig (1.7 atm) to about 500 psig (35 atm) in order to maintain selectivity for linear and near linear isomers and avoid polymerization of the olefin.

4. Claims 5,6,17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura in view of Lee as applied to claim 1 above, and further in view of Holtermann (US 5149894).

5. With respect to claims 5 and 6, Nakamura in view of Lee disclose everything in claim 1 (see paragraph 5), but do not disclose where the biphenyl is continuously contacted with the solid catalyst at a weight hourly space velocity of between about 0.1 and about 2.5 1/h.

However, Holtermann discloses where the biphenyl is fed at a WHSV of from about 0.5 to about 50 (see Holtermann, column 9, lines 36-42 and column 10, lines 41-49).

Holtermann discloses that the biphenyl is generally fed at that rate because the reaction pressure should be sufficient to maintain at least a partial liquid phase to retard catalyst fouling (see Holtermann, column 10, lines 41-49).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Nakamura in view of Lee to include the biphenyl is fed at a WHSV of from about 0.5 to about 50 in order to slow catalyst fouling.

6. With respect to claims 17 and 18, Nakamura in view of Lee disclose everything in claim 1 (see paragraph 5), but do not disclose where the biphenyl and inert solvent are continuously contacted with the acidic catalyst at a feed rate corresponding to between about 1 and about 3 catalyst bed volumes per hour.

However, Holtermann discloses where the alkylation reaction has a LHSV of from about 0.1 to about 10 1/h (see Holtermann, column 13, lines 7-22).

Holtermann discloses that the LHSV is dependent upon the reaction temperature and pressure (see Holtermann, column 13, lines 43-47).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Nakamura in view of Lee to include where the alkylation reaction has a LHSV of from about 0.1 to about 10 1/h because the LHSV is dependent on the temperature and pressure of the alkylation reaction.

7. Claims 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura in view of Lee and Holtermann.

8. With respect to claims 19, 20, and 22, Nakamura discloses a process for producing 4,4'-diisopropylbiphenyl by contacting a biphenyl with propylene (where the molar ratio of propylene to biphenyl is 0.5 to 2.2) and a mordenite or ZSM-5 type catalysts (that have a molar ratio of SiO_2 to Al_2O3 of from 10 to about 50) at a temperature between 220 and 300 degrees C (see Nakamura, column 2, lines 1-37, 53-56 and 67-68).

Nakamura does not disclose that the reaction is continuous and that the feed is contacted with at least one inert solvent and an inert diluent gas. Nakamura does not disclose where the contacting is performed under a pressure of from about 2 atmospheres to about 50 atmospheres. Nakamura does not disclose where the biphenyl and inert solvent are continuously contacted with the acidic catalyst at a feed rate corresponding to between about 0.1 and about 5 catalyst bed volumes per hour.

Nakamura does not disclose where the product 4,4'-diisopropylbiphenyl is being produced with a selectivity of at least 70%.

However, Lee discloses where the alkylating agent is diluted with a diluent gas including nitrogen and argon (see Lee, column 7, lines 3-15). Lee also discloses where the process is operated continuously (see Lee, column 15, lines 50-62). Lee also discloses where the selectivity for arriving at a specific alkylated product is typically between 25 to about 80% (see Lee, column 17, lines 18-48).

Lee discloses that the use of a diluting agent increases the selectivity to near linear isomers (see Lee, column 7, lines 4-6). Also, MPEP §2144.04 V. E. cites *In re Dilnot*, 319 F.2d 188 (CCPA 1963), which held that continuous operation would have been obvious over the batch processes of the prior art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Nakamura to include here the alkylating agent is diluted with a diluent gas including nitrogen and argon in order to increase the selectivity to near linear isomers and to include where the process is operated continuously because continuous operation would have been obvious over the batch processes of the prior art.

Also, Lee discloses where a decalin solvent is mixed with the biphenyl (see Lee, column 6, lines 9-16).

Lee discloses that the use of a solvent increases the selectivity to near linear isomers (see Lee, column 7, lines 4-6).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Nakamura to include where a decalin solvent is mixed with the biphenyl in order to increase the selectivity to near linear isomers.

Lee also discloses where the contacting is performed under a pressure from about 10 psig (1.7 atm) to about 500 psig (35 atm) (see Lee, column 16, lines 30-41).

Lee discloses that a pressure less than 10 psig causes the catalyst to lose selectivity for linear and near linear isomers and a pressure greater than 500 psig will cause the olefin to polymerize (see Lee, column 16, lines 30-41).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Nakamura to include where the contacting is performed under a pressure from about 10 psig (1.7 atm) to about 500 psig (35 atm) in order to maintain selectivity for linear and near linear isomers and avoid polymerization of the olefin.

In addition, Holtermann discloses where the alkylation reaction has a LHSV of from about 0.1 to about 10 1/h (see Holtermann, column 13, lines 7-22).

Holtermann discloses that the LHSV is dependent upon the reaction temperature and pressure (see Holtermann, column 13, lines 43-47).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Nakamura in view of Lee to include where the alkylation reaction has a LHSV of from about 0.1 to about 10 1/h because the LHSV is dependent on the temperature and pressure of the alkylation reaction.

9. With respect to claim 21, Nakamura in view of Lee and Holtermann disclose everything in claim 20 (see paragraph 13), but Nakamura does not disclose where the biphenyl is continuously contacted with the solid catalyst at a weight hourly space velocity of between about 0.025 and about 10 1/h.

However, Holtermann discloses where the biphenyl is fed at a WHSV of from about 0.5 to about 50 (see Holtermann, column 9, lines 36-42 and column 10, lines 41-49).

Holtermann discloses that the biphenyl is generally fed at that rate because the reaction pressure should be sufficient to maintain at least a partial liquid phase to retard catalyst fouling (see Holtermann, column 10, lines 41-49).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Nakamura in view of Lee to include the biphenyl is fed at a WHSV of from about 0.5 to about 50 in order to slow catalyst fouling.

Response to Arguments

10. Applicant's arguments filed 9/01/2006 have been fully considered but they are not persuasive.

11. Applicant first argues that the Lee reference does not disclose a continuous process in which reactants are added while simultaneously removing products. However, according to *In re Dilnot*, 319 F.2d 188 (CCPA 1963), the claimed continuous operation would have been obvious in light of the batch process over the prior art (see

MPEP 2144.04V. E.). Thus, merely converting a prior art batch process to a continuous process is obvious.

12. Applicant's arguments with respect to claim 1, 19, and 22 concerning the selectivity being at least 70% have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John C. Douglas whose telephone number is 571-272-1087. The examiner can normally be reached on 7:30 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JCD

11/02/2006

Glenn Caldarola
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